



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/672,521

09/26/2003

Toru Takayama

0553-0193.01

1175

7590

02/03/2006

Edward D. Manzo  
Cook, Alex, McFarron, Manzo,  
Cummings & Mehler, Ltd.  
200 West Adams St. Ste. 2850  
Chicago, IL 60606

EXAMINER

NGUYEN, HA T

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 02/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

EJK

<b>Office Action Summary</b>	<b>Application No.</b> 10/672,521	<b>Applicant(s)</b> TAKAYAMA ET AL.	
	<b>Examiner</b> Ha T. Nguyen	<b>Art Unit</b> 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12-05-06.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 26-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 26-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Notice to applicant*

1. Applicants' Amendment and Response to the Office Action mailed 8-9-2005 and Request for a Continued Examination have been entered and made of record. Following is an Office Action responding to the request.

### *Claim Rejections - 35 USC, § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103 and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 26-28, 30-31, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda (USPN 6078071) in view of Oikawa et al. (USPN 4619695, hereinafter "Oikawa") and Shindo et al. (USPN 5667665, hereinafter "Shindo").

Referring to Figs. 5E-6E and related text, Matsuda discloses [Re claim 26] a method of manufacturing a wiring in a semiconductor device comprising the steps of: forming a tungsten film 128 or 210 by a sputtering method; and patterning the tungsten film (see Fig. 5F or 6F). But it fails to disclose expressly wherein an amount of sodium contained within the wiring is 0.3 ppm or less. However, the missing limitation is well known in the art because Oikawa discloses

Art Unit: 2812

refractory metal target for sputtering of low Na impurity (See col. 6, lines 16-26 and col. 8, lines 6-13) and Shindo discloses refractory metal target containing Na impurity at a concentration less than 0.05 ppm giving sputtered layer containing less than 0.05ppm Na impurity (see col. 9, lines 16-32) . A person of ordinary skill is motivated to modify Matsuda with Oikawa and Shindoto obtain wiring of good performance characteristics (see Oikawa, Summary).

[Re claim 27] Oikawa also discloses wherein the sputtering tungsten target having a purity of 4N or more (see Example and col. 8, lines 6-17); and

[Re claim 28] wherein the sputtering method uses argon as a sputtering gas (see col. 2, lines 3-6).

[Re claim 30] Matsuda also discloses wherein the sputtering method is performed at a gas pressure from 1.0 Pa to 3.0 Pa (see col. 8, lines 27-36).

[Re claim 31] The combined teaching of Matsuda, Oikawa and Shindo discloses substantially the limitations of claim 31, as shown above. It also discloses the patterning to form a gate electrode 110 (see Matsuda, col. 10, lines 10-13).

[Re claim 35] Matsuda also discloses wherein the sputtering method is performed at a gas pressure from 1.0 Pa to 3.0 Pa (see col. 8, lines 27-36).

Therefore, it would have been obvious to combine Matsuda with Oikawa and Shindo to obtain the invention as specified in claims 26-28, 30-31, and 35.

4. Claims 29-30 and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Oikawa and Shindo, as applied above, and further in view of Brodsky et al. (USPN 6245668, hereinafter "Brodsky").

[Re claims 29-30] The combined teaching of Matsuda, Oikawa, and Shindo discloses substantially the limitations of claims 29-30, as shown above. But it fails to disclose expressly the claimed sputtering conditions. However, the missing limitations are well known in the art because Brodsky discloses these features (See col. 2, lines 41-54 and col. 5, lines 26-36). A person of ordinary skill is motivated to modify Matsuda, Oikawa, and Shindo with Brodsky to obtain W layer at a low temperature ensuring the reliability of the device made.

[Re claims 32-35] The combined teaching of Matsuda, Oikawa, and Shindo discloses substantially the limitations of claims 32-35, as shown above. But it fails to disclose expressly

Art Unit: 2812

the sputtering conditions and the purity of the W target . However, the missing limitations are well known in the art because Brodsky discloses these features (See col. 2 , lines 41-54, col. 4, lines 41-44, and col. 5, lines 26-36).

Therefore, it would have been obvious to combine Matsuda, Oikawa, and Shindo with Brodsky to obtain the invention as specified in claims 29-30 and 32-35.

5. Claims 36 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Oikawa and Shindo, as applied above, and further in view of Kobeda et al. (USPN 5208170, hereinafter “Kobeda”).

The combined teaching of Matsuda, Oikawa, and Shindo discloses substantially the limitations of claims 36 and 41, as shown above.

But it fails to disclose expressly forming a semiconductor film over the wiring.

However, the missing limitation is well known in the art because Kobeda discloses this feature (See abstract ).

A person of ordinary skill is motivated to modify Matsuda, Oikawa, and Shindo with Kobeda to obtain an etch stop layer in subsequent forming steps using dry etching.

Therefore, it would have been obvious to combine Matsuda, Oikawa, and Shindo with Kobeda to obtain the invention as specified in claims 36 and 41.

6. Claims 37-40 and 42-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Oikawa, Shindo, and Kobeda, as applied above, and further in view of Brodsky.

All the features of claims 37-40 and 42-45 have been previously shown to be obvious to an ordinary artisan.

Therefore, it would have been obvious to combine Matsuda, Oikawa, Shindo, and Kobeda with Brodsky to obtain the invention as specified in claims 37-40 and 42-45.

7. Claims 46-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over the cited references, as applied above, and further in view of Mizuno et al. (USPN 5840366, hereinafter “Mizuno”).

The combined teaching of the applied references discloses substantially the limitations of claims 46-49, as shown above.

But it fails to disclose expressly the claimed stress level of the W conductor (wiring or gate electrode).

However, the missing limitation is well known in the art because Mizuno discloses the forming of W conductor having a stress level of  $4.1 \times 10^9$  dyn/cm<sup>2</sup> (See Example 2 ).

A person of ordinary skill is motivated to modify the applied references with Mizuno to obtain better surface morphology .

Therefore, it would have been obvious to combine the applied references with Mizuno to obtain the invention as specified in claims 46-49.

### ***Response to Amendment***

8. In view of Applicants' arguments the rejection of claims 1-45, as stated in the Office Action indicated above, has been withdrawn.

Applicants' arguments with regard to the rejections under 35 U.S.C. 103 have been rendered moot in view of the new ground of rejection

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha T. Nguyen whose telephone number is (571) 272-1678. The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week. The telephone number for Wednesday is (703) 560-0528.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt, can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

Art Unit: 2812

system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HN

01- 31 -06

A handwritten signature in black ink, appearing to be 'Ha Nguyen', with a stylized, cursive-like script.

Ha Nguyen

Primary Examiner